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ABSTRACT

Arranged in six sections, this booklet provides teachers and administrators with basic information and resources on the educational uses of the microcomputer. Section 1 uses a question and answer format to address concerns teachers frequently have about the effects of computer education on their teaching. Questions covered include effects on teaching jobs and the need for and time involved in learning to use the computer. Section 2 describes the main parts of the computer, while section 3 reviews the features and operation of the 5 most popular microcomputers used in schools. Section 4 outlines the three ways microcomputers are generally used in education: ccomputer assisted instruction (CAI), computer literacy, and administrative aid. A model for establishing a modest computer center is provided in section 5. Discussion centers around factors to consider in room choice, classroom procedure, and offered activities. The remainder of this booklet contains resource materials, including a hardware evaluation checklist, software evaluation procedure, an educational software directory, two bibliographies, and a glossary of computer terms. (LP)

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CENTERING ON

MICROCOMPUTERS: AN INTRODUCTORY GUIDE

Russell Zausmer

P.S. 16R

New York City
Teacher Centers Consortium
260 Park Avenue South
New York, New York 10010
212-475-3737

New York City Board of Education

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FOREWORD

This publication has been prepared by the New York City Teacher Centers Consortium which is a cooperative project of the United Federation of Teachers, the Board of Education, participating Community School Districts and the High School Division. The resource information contained in Centering On Microcomputers - An Introductory Guide was identified, compiled and written at the Consortium's Publication and Dissemination Center in response to expressed requests by New York City teachers.

One primary purpose of the Publication and Dissemination Center is to share information and successful teaching practices by identifying and disseminating publications that have been suggested and written by teachers. Teachers are invited to submit innovative instructional curriculum materials and ideas which have been found to enhance the learning potential of students.

Please send to:

John K. Walton, Publication Coordinator
New York City Teacher Centers Consortium
260 Park Avenue South
New York, New York 10010

Myrna Cooper
Director

1982

ABOUT THE AUTHOR...

Russell Zausmer has been teaching in New York City public schools for fifteen years. He is presently a teacher of computer science at P.S. 16, Staten Island. For the past four years he has been working in the areas of computer literacy and computer science. He was one of the first teachers in New York City to give workshops on computer education to teachers, parents and students. He has written numerous articles on computer literacy for computer magazines and has evaluated software for major publishing companies.

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PUBLICATION COORDINATOR _____ John K. Walton

EDITORIAL _____ Frank Cimino
Miriam Smith
John K. Walton

SECRETARIAL _____ Carolyn Harrison

DESIGN AND LAYOUT _____ John K. Walton

INTRODUCTION

Computing in schools is coming of age very rapidly. In 1983, 1 out of every 3 schools in the United States will either own or have access to some type of computer equipment for classroom use. This sudden rise in computer use in the schools is due to the development of the microcomputer.

With the advent of the microcomputer, many schools can now afford to join this technological revolution. Today's small computers are much less costly and even more powerful than the earlier, larger machines. They also offer special features that in the early 1970's were unavailable in the larger more complicated systems. Features such as color graphics, animation, and sound are available on most systems. The micrcocomputers are self-contained, portable, desk-top machines and have proven to be very reliable. As a result, the use of computers in the school system is now much more affordable, more convenient and more effective than ever before.

Microcomputers can effectively be used in grades kindergarten through high school and can be used with students in heterogeneous settings. Computers can be used for remedial and enrichment purposes. The use of microcomputers can encompass all curriculum areas. We, as educators, must learn to use this powerful educational tool to our best advantage. However, we must remember, a computer is just a tool and like any tool or instrument it must be guided by capable, willing, and understanding hands. It needs you, the teacher, to harness its power effectively.

TABLE OF CONTENTS

FOREWORD ____ i

ABOUT THE AUTHOR . . . / ACKNOWLEDGEMENTS ____ ii

INTRODUCTION ____ iii

TABLE OF CONTENTS ____ iv

QUESTIONS FREQUENTLY ASKED ABOUT MICROCOMPUTERS ____ 1

GENERAL DESCRIPTION OF MICROCOMPUTERS ____ 4

THE BIG FIVE ____ 7

- APPLE II ____ 7
- ATARI 800 (400) ____ 9
- COMMODORE PET ____ 10
- TI-99/4A TEXAS INSTRUMENTS ____ 11
- TRS-80 MODEL III ____ 13

HOW COMPUTERS ARE USED IN SCHOOLS ____ 14

SETTING UP A COMPUTER CENTER IN SCHOOL ____ 17

- ROOM ASSIGNMENT ____ 17
- CLASSROOM PROCEDURES ____ 19

EVALUATING HARDWARE CHECKLIST ____ 22

EVALUATING SOFTWARE ____ 24

EDUCATIONAL SOFTWARE DIRECTORY ____ 27

MAGAZINE BIBLIOGRAPHY ____ 31

BOOK BIBLIOGRAPHY ____ 33

GLOSSARY OF COMPUTER TERMS ____ 34

QUESTIONS FREQUENTLY ASKED ABOUT MICROCOMPUTERS

The questions below are the most frequently asked questions by teachers concerning computer use in the schools.

1. **WHAT ARE THE MAJOR PARTS OF A MICROCOMPUTER?**

   A microcomputer set up may consist of 3 or 4 components. These components are the keyboard, television screen, a recording and playback device for programs (cassette recorder and/or disk drive), and sometimes a printer.

2. **WHAT IS SOFTWARE AND HARDWARE?**

   Software is a program (s) that when loaded into a computer, makes the computer follow specific instructions (a math program that teaches children addition is an example of software); hardware is any part of the computer that is a physical part of the machine (a printer would be considered hardware).

3. **IF MY SCHOOL BUYS 15 MICROCOMPUTERS, WON'T THESE MACHINES SOMEDAY REPLACE ME AS THE TEACHER?**

   Definitely not! All computers need much human interaction. Someone must write the programs that make them work; someone must be there to answer a child's question in a personal manner; a teacher is needed to explain certain points; and most of all children will always need a real live teacher to guide them.

4. **ARE MICROCOMPUTERS, AND THE SOFTWARE FOR THEM, VERY EXPENSIVE?**

   Computer prices are rapidly falling, while software prices are rising. Computers range in price from $ 99.00 for a simple, yet adequate programming device, up to $ 2,000.00 for a very sophisticated machine for school use. Software costs are rising because you must pay someone to write the programs. Quality educational software starts at about $ 30.00, and large, comprehensive packages can cost up to $ 500.

5. **WHY IS THERE SUCH A VARIANCE IN PRICE FOR HARDWARE AND SOFTWARE?**
The wide range in price is subject to the brand that is purchased and to the features that are selected for each brand. Some computers that generate color and sound will cost more. If software contains fancy illustrations, student management and automatic record keeping, or other extras, then that software will be more expensive. Usually, but not always, you get what you pay for.

6. **WILL IT TAKE ME A LONG TIME TO LEARN HOW TO OPERATE AND PROGRAM A COMPUTER?**
Most computers today are very "user friendly". They allow the first time user to immediately sit down at the computer and start to interact with it. All of the computers come with very complete operating instructions. Learning how to program a computer usually takes more time and much practice, but can easily be done. There are many courses given in computer literacy, especially for teachers, by the N.Y.C. Teacher Centers Consortium and by the Board of Education.

7. **DO I HAVE TO LEARN A WHOLE NEW LANGUAGE, A SPECIAL COMPUTER LANGUAGE, TO BE ABLE TO SUCCESSFULLY USE A MICROCOMPUTER?**
To be able to use most pre-packaged software, little knowledge of a computer language (which is usually B.A.S.I.C.) is needed. Most programs are "self-prompting". Menus are given on the screen and you simply select which program, part of a program, or option you wish to see. Some simple commands are needed to run the computer, but these will be explained in this manual and are outlined in the instructions that come with the computer that you purchase.

8. **CAN I OR A STUDENT BREAK A COMPUTER BY PRESSING THE WRONG KEYS ON THE KEYBOARD?**
You may type anything you want on a computer--no damage will occur to the computer. Don't be afraid to touch and experiment!

9. **ARE THERE EVER ANY MECHANICAL FAILURES WITH MICROCOMPUTERS?**
Yes, but rarely. Microcomputers have an excellent frequency of repair-they are very reliable. If a repair is needed, the repair can usually be done very quickly, because the computer has the ability to analyze itself for most problems.

10. *WITH WHAT GRADE LEVELS CAN COMPUTERS BE USED?*

Every student, at any grade level, can benefit from using a microcomputer. You're never too young or too old to use one.

11. *ISN'T IT BORING TO LEARN BY SITTING IN FRONT OF A MACHINE?*

Anything can become boring, but students certainly seem to enjoy the challenge and experience of using computers in their classrooms. The classroom teacher is the key, as in all subject areas, to keeping the lessons fresh, exciting, and interesting.

12. *WITH ALL THE PAPER WORK AND RESPONSIBILITIES IN THE CLASS, IT WOULD SEEM THAT MORE TIME IS NEEDED FOR PLANNING, CHECKING AND RECORD KEEPING WHEN STUDENTS USE THE MICROCOMPUTERS. HAS THIS BEEN FOUND TO BE TRUE?*

The time used to preview programs and set a schedule for the class is not overwhelming. The only extra time needed would be at the introductory stage when you are becoming acquainted with the programs and the computer and the implementation of it into your classroom curriculum. Futhermore, many programs have their own "classroom management" system built in, to facilitate record keeping automatically.

13. *DO I HAVE TO BE A MATH MAJOR TO USE THE COMPUTER EFFECTIVELY?*

Absolutely not! Anyone, with any subject area major can effectively use and enjoy the microcomputer. In the "early" days of computer use in the 1970's, a math background did help. Now however, computers can certainly be for everyone. n teachers!

14. *IS THERE REALLY A NEED FOR ME, AS A TEACHER, TO BECOME COMPUTER LITERATE?*

It is quickly becoming a computer world. It is imperative that the schools take the lead in this computer revolution, and that teachers quickly adapt themselves to this new technology.

15. *WHAT'S A COMPUTER'S FAVORITE SONG?*

"Thanks for the Memories".

GENERAL DESCRIPTION OF MICROCOMPUTERS

A microcomputer usually consists of three main parts. Sometimes these parts are physically together and at times they are three separate parts connected together by wires. Whatever brand you own they all share these three main parts:

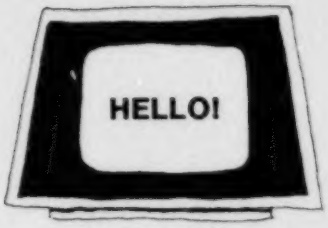
1. The Keyboard

The keyboard looks very much like a regular typewriter keyboard. All of the letter keys and number keys are in the same place. However there are some extra keys on most computers. The important extra keys are:

"Tells" the computer that you are ready to continue or feed the information to the computer's memory. (This key is usually located in the upper right hand corner.)

Stops a program or stops and starts the computer.

2. The Television Screen or Television Monitor



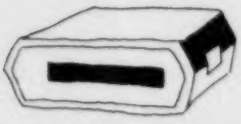
Every computer must have some type of T.V. screen so that the person can:

- See what is being typed on the computer
- View a program

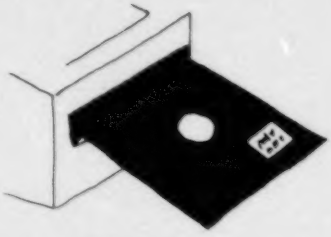
Remember, that although the keyboard of a computer is very similar to a typewriter's keyboard, a computer doesn't contain paper for us to see what we are typing (although you can obtain a printout by hooking up a printer to the computer).

The information you type is printed out on the screen. On computers that generate color, you could use a color television. A T.V. monitor is just like a regular television except that it does not have a tuner to receive channels and has a better resolution to see letters and other information on the screen.

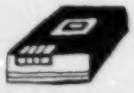
3. Recording Devices–Disk Drive and Cassette Recorder



Disk Drive



Diskette



Cassette Recorder

In 99% of all microcomputer set-ups, a recording device is included. A disk drive is a machine, usually a small box, that can save and use computer information (programs) on a magnetic disk. The magnetic disk goes into the disk drive and programs can be saved and loaded to and from the computer. The disk or mini-floppy diskette looks like a 45 RPM record with a square black plastic jacket. A cassette recorder can also be used to save and load programs and can use regular audio cassettes. The disk drive can store much more information and retrieve it very rapidly, while a cassette is much less expensive.

The Printer

A printer is added to a computer so that you may receive a "hardcopy" or printout of a program, student records, or other data that you want to look at on paper.

And YOU!

Contrary to popular belief a computer does not usually run itself. If you just turn it on, it will just sit there staring at you. You or your students must do something to it. Without you, nothing happens. Isn't it nice to be needed?

INSIDE THE COMPUTER

If you could look inside a microcomputer, and with some brands you can (Apple, Atari), you would see many rectangular black shapes. These are called microcomputer chips. A chip is a small piece of material used with computers which carry many electrical signals and translate some of these signals into instructions for the computer. The largest of these chips in any computer is the microprocessor. This large chip makes the computer work. Different computers have different microprocessors with names like - 6502, 6800, Z80. There are other chips called ROM (Read Only Memory) that contains the computer's special operating instructions which are different for each brand of computer. This ROM memory cannot be erased, even when you shut off the computer. RAM memory holds or stores programs or instructions only while the computer is operating. RAM (Random Access Memory) is erased when you turn off the computer. The more RAM a computer has, the more instructions, letters, or words it can hold. A computer with 16k (kilobytes, kilo=1,000) can store about 16,000 characters or individual letters, numerals or about 3-5 typewritten pages. A 48k machine will hold three times as much material.

Inside most microcomputers you will also find: some type of power supply or transformer; printed circuit boards; some open slots for expansion of the unit to add more RAM (remember that?) chips; or other special cards to control various devices, such as printers, modems-which allow your computer to communicate with another computer via telephone; many connection points for cassette recorders; printers; and game paddles.

THE BIG FIVE

The next section will briefly look at the five most popular microcomputers used in schools today. A brief description of each will be given with a "how-to" section. It should be noted that this part of the manual will only give a rudimentary introduction to each microcomputer. Each machine comes with very comprehensive, user friendly guides and instructions. There are numerous introductory books written for each computer. Other information about your machine can be obtained from your local computer store or the many "user groups" in the area.

APPLE II

Apple Computer, 10260 Bandley Dr., Cupertino, CA. 95014, #408 996-1010

FEATURES:

Large amount of software, easy expansion, very good graphics, color, built-in sound, supports many languages.

THE KEYBOARD:

The Apple has the following extra keys: **RETURN**-press this to enter your inputs into the computer's memory; **REPT**-press and hold to repeat certain keys; **RESET**-clears the computers memory and restarts the computer; **CTRL**-use in conjunction with other keys for special "control" commands from the keyboard; **ESC**-escape key-has special combined functions.

HOW TO TURN IT ON:

As you are facing the keyboard, the on-off switch is located in the left rear corner of the computer. The light on the keyboard labeled "power" will light up, but this is only a power-on indicator. If you have a disk drive connected to the computer, but do not have a diskette in the computer, hold down the **CTRL** and **RESET** key together, to shut off the disk drive.

HOW TO CONNECT THE MONITOR OR T.V., A DISK DRIVE, OR CASSETTE RECORDER.

Follow the directions from your computer instructions. Make sure that when you lift the cover to the computer that the power is **OFF**. Simply lift off the back corners and slide the cover back to remove it.

HOW TO SAVE AND LOAD YOUR PROGRAM WITH A CASSETTE RECORDER:

Hook up your recorder to the computer (right rear inputs). Press down play and record buttons on the recorder. Type **SAVE** on the computer and then press the return key. You will hear a "beep" and the cursor (little flashing box on the screen) will disappear and then come back with another "beep". The program is now saved on the tape. To load a program, first type **NEW** to erase the computer's memory. Then type **LOAD**, press the play button of the recorder, press the **RETURN** key. The cursor will disappear as above and your program will be loaded. When using the cassette, use the tape counter so that you will know where your programs begin on each tape.

HOW TO SAVE AND LOAD YOUR PROGRAM WITH A DISK DRIVE:

When you handle a disk be very careful that you do not get it dirty and that you do not subject it to any magnetic fields. This can erase the entire diskette. This rule holds true for any computer. After you have written your program, you must give it a name. Then type **SAVE** (name of your program) and press **RETURN**. The red light on the disk drive will go on and then off. The program is saved. Type **CATALOG** and press **RETURN** to see a table of contents on your disk. To load a program from the disk, type **LOAD** (name of your program) and press **RETURN**. Again the red light will go on and off and your program will be loaded. To execute (no, you are not going to shoot it) your program, type **RUN**. You must type the program name exactly as it appears in the catalog. Read your instruction manual.

HOW TO RUN PRE-PACKAGED SOFTWARE:

Most software on cassette is loaded as above. Most software on disks are loaded by first putting the disk into the disk drive, before you turn on the computer. The programs in the diskette will load automatically, after turning on the computer. If they do not load, your disk does not contain a Disk Operating System (Disk instructions). See your disk manual under the section, "D.O.S." (Disk Operating System).

SPECIAL TERMS:

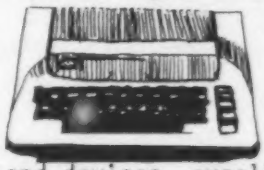
(Press **RETURN** after each one) **HOME**-clears the screen, but does not erase memory; **NEW** - this command erases the memory; **LIST**-this prints out onto the screen your program statements; **RUN**-this executes your program; **CTRL-C** (hold down both keys together and then release) - this stops the execution of the program.

HOW TO TURN THE COMPUTER OFF:

Easy-just push the on-off switch (remember its in the left rear). Then turn off the monitor or T.V.

ATARI 800 (or 400)

Atari Consumer Division, 1265 Borregas Avenue., Sunnyvale, CA 94086 #408 745-2038



FEATURES:

Easy expansion of memory and devices, excellent graphics, color, sound built-in, lower case, good editing features, special graphic keys, plug in cartridges and languages. NOTE: The main difference between the Atari 800 and Atari 400 is the type of keyboard used. The 800 has a standard "feel", while the Atari 400 uses a flat, plastic keyboard. Most other capabilities are the same.

THE KEY BOARD:

The Atari has four yellow special function keys, mainly used for pre-packaged software and cartridges. They are: **SYSTEM RESET** - stops program execution and can restart the system; **OPTION** - used to choose various options that a program might have; **SELECT** - used to select various functions; **START** - used to start special programs: **CAPS**/Lower used to choose between upper and lower case; **CTRL** (control key) used in conjunction with other keys for special functions; -this key switches between regular and inverse screen; **BACK S**- back space key; **INSERT-DELETE** - used for editing; **BREAK**-stops the execution of programs. There are more speical keys and most can change into special graphic characters. Please refer to the owner's manual for a more detailed explanation.

HOW TO TURN IT ON:

Facing the keyboard locate the on-off switch on the right side of the computer. The red power light will come on. Turn on the T.V. or monitor.

HOW TO SAVE AND LOAD YOUR PROGRAM WITH A CASSETTE RECORDER:

Type **CSAVE** and press **RETURN**. The built-in speaker will beep twice. This is your signal to depress the play and record buttons of the tape recorder. Press **RETURN** once again and the **SAVE** procedure will start. Wait until you see "ready". Use the tape counter on the recorder to locate a particular program. To load a program type **CLOAD** and **RETURN**. The speaker will beep once. This is your signal to depress the play button on the recorder. Then press **RETURN** again and the loading procedure will start. Wait until you see "ready" to continue. Refer to your instruction manual for alternate **SAVE** and **LOAD** commands.

HOW TO SAVE AND LOAD YOUR PROGRAM WITH A DISK DRIVE:

Make sure that you have a diskette in the disk drive. Follow this start up procedure: First turn on the disk drive (switch is on the front of the disk drive) - the red light will come on and then go out. Now turn on the computer console. The disk red light will come on again and load in the Disk Operating System (the disk instructions). Follow the instruction manual for the **SAVE** and **LOAD** commands, because there are various ways to do these procedures.

HOW TO RUN PRE-PACKAGED SOFTWARE:

The Atari can use "program cartridges". These cartridges contain entire programs. To use them follow this procedure: Turn off everything!! Open the cartridge door-flap, located in the front middle of the console. Put the cartridge into the **LEFT** slot, if you are using the Atari 800 or into the only slot on the Atari 400. Once the cartridge is in place, close the door-flap, until it "clicks". Then turn on the console - instant program. Follow the directions on the screen. To **RUN** cassette or disk programs, follow the instructions that come with the courseware.

SPECIAL TERMS:

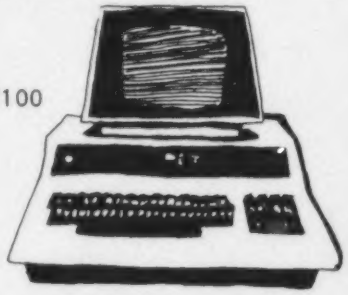
Most special terms are accessed via the keyboard. The Atari has many special graphics, and sound terms. Refer to your instruction manual.

HOW TO TURN IT OFF:

Turn off the console switch. Turn the monitor off. Make sure that you turn off the disk drive switch. If there are no red lights on, then everything is off.

COMMODORE PET

Commodore, 950 Rittenhouse Road, Norristown, PA 19401, #215 337-7100



FEATURES:

airly large amount of software, lower case, some graphics characters built-in, good editing features, all in one unit.

THE KEY BOARD:

The PET has special graphics keys, which when pressed give you certain graphic symbols (square, circle). The PET has the following extra keys: **INST-DEL** this multi-key inserts or deletes characters; **CLR-HOME**-this multi-key clears the screen and "homes" the cursor to the upper left screen position; **OFF-REV**-this multi-key allows you to reverse the black and white characters (Reverse is like the negative of a photograph); **SHIFT-LOCK** - locks keys in upper case; **RUN-STOP** - this multi-key stops program execution and loads and runs a program from a cassette or disk. Other special function keys are explained in the owner's manual.

HOW TO TURN IT ON:

Facing the keyboard, reach around to the left back of the computer for the on-off switch.

HOW TO SAVE AND LOAD YOUR PROGRAM WITH A CASSETTE RECORDER:

Type the command **SAVE** (program name) and press **RETURN** and follow the instructions that will appear on the screen. To load a program, type **LOAD** (program name) and press **RETURN** and follow the instructions that will appear on the screen. If you have any trouble refer to the PET manual.

HOW TO SAVE AND LOAD YOUR PROGRAM ON A DISK DRIVE:

Make sure you have a diskette in the disk drive. Type **SAVE** or **DSAVE** "drive number: name of program" and press **RETURN**; wait for the word "ready" to appear on the screen (Example - SAVE "0: Math" = save, drive number 0, program is Math). To load a program, type the word LOAD or DLOAD and follow the same procedures above for the SAVE command. Check your manual for further instructions for your particular version of the Disk Operating System (DOS).

HOW TO RUN PRE-PACKAGED SOFTWARE:

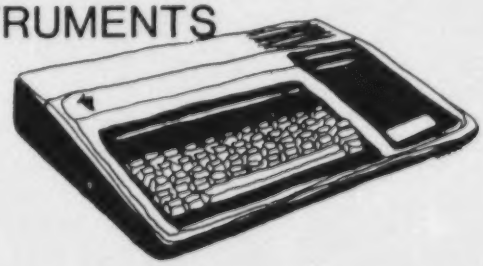
Follow the same procedures as in the loading instructions for cassette and diskette programs. Also follow the instructions that come with the software.

SPECIAL TERMS:

Most special terms on the PET are accessed via the special keys on the keyboard (see "keyboard" above). For additional functions look at your PET owner's manual.

TI-99/4A TEXAS INSTRUMENTS

Texas Instruments, Dallas, Texas



FEATURES:

Plug-in program cartridges, color, very good graphics, built-in sound.

THE KEY BOARD:

The TI has the following extra keys: **ENTER**-same as the **RETURN** key on the other computers; **SPACE BAR**-if you hold down the space bar or any other key for more than one second the key is repeated until you release it; **ALPHA LOCK**-Locks all letter keys into upper case; **FCTN**-function keys-several keys have varying functions for the TI-most have to do with editing - there is a keyboard overlay that is included with the TI to help you with the FCTN keys; **CTRL**-control key-used in conjunction with other keys for different functions.

HOW TO TURN IT ON:

As you are facing the keyboard, the on-off switch is on the lower right front of the console. Turn on your T.V.. If you have a command module in its slot, that program will appear when you turn on the TI.

HOW TO SAVE AND LOAD YOUR PROGRAM WITH A CASSETTE RECORDER:

The TI computer has a special **SAVE** function. As soon as you SAVE from the keyboard, the computer begins to print instructions on the screen to lead you step by step in this procedure.

During this procedure you will be asked yes and no questions. Just answer the questions and away you go! When you type **OLD** on the computer and press **ENTER**, the computer begins to print instructions on how to **LOAD** a program into the computer. Just follow the directions.

HOW TO SAVE AND LOAD YOUR PROGRAM WITH A DISK DRIVE:

First turn on the disk controller and disk drives. Then turn on the computer console and monitor. Insert a diskette and plug the Disk Manager Command Module into the command module slot (top right side of the console). A screen will appear with a "menu" (table of contents). Follow the instructions on the screen and in the Disk Memory System Manual. To **SAVE** a program onto the diskette to disk #();(Device) with this program name. Example - **SAVE DSK1.** Math - . To **LOAD** a program follow this sequence: "**OLD** device. program name." This is the same procedure as for saving, except you are using the load command-**OLD.**

HOW TO RUN PRE-PACKAGED SOFTWARE:

The TI has unique cartridges called "Solid State Software Command Modules" (SSSCM). You simply place the SSSCM into the slot on the right top of the computer and turn the computer on - presto - instant program. You can still **RUN** programs from cassette and diskette. Just follow the TI instructions (similar to the **OLD** command above).

SPECIAL TERMS:

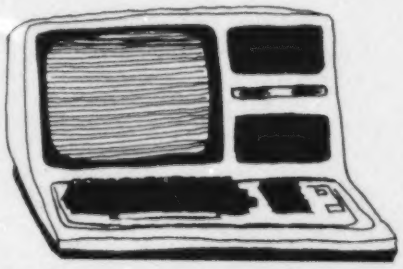
(press **ENTER** after each one) **NEW** - this command erases the memory; **FCTN** = (press the **FCTN** and = keys together and then release) - this returns the computer to the master title screen; **FCTN 4** - this command clears the screen; **FCTN 3** - this erases an entire program on line; **BYE** - as in bye, bye - this is similar to a **RESET** on other computers; **RUN**, **LIST** - same as on the Apple II and all other microcomputers.

HOW TO TURN THE COMPUTER OFF:

Guess what?? . . .
You guessed it! Just reverse the turn-on procedure.

TRS-80 MODEL III

Radio Shack/Tandy, 1300 One Tandy Ctr., Fort Worth, Texas 76102, #817 390-3011



FEATURES:
Large amount of software, good expansion possibilities, lower case, good editing features, supports many languages, all in one unit.

THE KEYBOARD:
CLEAR-clears the screen; BREAK - stops the execution of a program; ENTER - same as RETURN - used to enter your inputs into the computer's memory; RESET - clears the computer's memory and restarts the computer.

HOW TO TURN IT ON:

Facing the front of the computer, reach under the front right hand side and find the on-off switch. If you have a disk drive and don't want to have the disk go on when you first turn on the computer, hold down the shift and Break key when you turn on the computer. If you want to use the disk drive when you first turn on the computer, make sure you have a diskette in the drive, that includes the disk operating system.

HOW TO SAVE AND LOAD YOUR PROGRAM WITH A CASSETTE RECORDER:

Press down the play and record buttons on the tape recorder and type in **CSAVE** and press **ENTER**. Wait until "ready" appears on the screen. To load a program, press the play button on the recorder and then type **CLOAD** and press **ENTER**. You will see two ** on the screen, one will be flashing. This indicates that the program is loading properly.

HOW TO SAVE AND LOAD YOUR PROGRAM WITH A DISK DRIVE:

Make sure you have a diskette in the disk drive. Type **SAVE** (name of program) and press **ENTER**. The disk drive light will go on and then off after your program is saved. **"Ready"** will appear on the screen. To load a program, type **LOAD** (name of program) and press **ENTER**. Your program will be loaded. Type **RUN** to execute the program.

HOW TO RUN PRE-PACKAGED SOFTWARE:

Most disk programs will run automatically when you first turn on the computer. For other programs and when using the cassette recorder, follow the guidelines above and the instructions that come with the software.

SPECIAL TERMS:

CLS - this clears the screen, but not the memory; **NEW**, **LIST** and **RUN** are the same as on the Apple, Atari and Pet; See your computer owner's manual for more special functions.

HOW COMPUTERS ARE USED IN SCHOOLS

Use of microcomputers in the schools usually fall into three areas:

Computer Assisted Instruction

This is the computer being used to teach the student in a particular subject area. There are three major types of C.A.I. systems and software: tutorial, drill and practice, and simulation.

TUTORIAL

Using tutorial software a student is presented with a topic and is "taught" various concepts. This type of C.A.I. is used to teach a student certain principles from step A, to step B, to step C, right to the end of the lesson. Then some type of review is presented to see if the student has mastered the lesson.

DRILL AND PRACTICE

Drill and practice is the most common use of C.A.I. There is more software of this type than any other. With drill and practice, it is assumed that the concept or topic has previously been introduced by the teacher. It is the purpose of this software to quickly review certain areas and then test the student on his mastery. Much drill and practice software is very repetitive and mimics a workbook environment. However, there is some excellent drill and practice software that makes the the repetition exciting and fun.

SIMULATION

The third and most intriguing type of C.A.I. use is in the realm of simulation. Computers can allow the teacher to have the student interact in a different setting, one that would not be possible without the aid of a computer. A popular software program of this type "puts" the student in a small lake and asks the child to become a fish. The student (fish) must try to survive in that lake as a fish might try to cope

with life underwater. He must not be eaten by bigger fish; he must eat insects; he must make sure that he is not caught by the fisherman waiting above. Programs of this type make use of all the amazing powers of a computer: color, graphics, sound, capacity to probe the students mind quickly and help guide him toward decisions.

C.A.I. does have many advantages over the more traditional classroom. With computer assisted instruction, the machine quickly adapts its pace to that of the student. The slower student can ask for many repetitive questions for help without embarrassment and the machine will have infinite patience, it never gets angry! The brighter student can skip portions of a program that he understands and proceed at his own pace. With well-produced software the student is unlikely to become frustrated or bored. The computer program will also "graduate" the student to a higher level or review questions if many are missed. It keeps the individual going at his own rate. The computer can also free the classroom teacher from certain tedious tasks and allow more individual and personal involvement with the students.

C.A.I. is not the answer for every teacher or student, but it does have tremendous benefits. The programs must be of superior quality to keep the student's interest and the software must be educationally sound.

Computer Literacy

This is the study of the how, what, and why of microcomputers. Computer literacy is becoming an important part of any computer curriculum. All students and teachers should become literate about computers.

A typical computer literacy course of study would include the history of computers, computer terminology, computer programming (learning how to instruct the computer to carry out your wishes), computers in society and evaluation techniques for software and hardware.

Administrative Uses

This can run the gamut from keeping school pupil and class scheduling to keeping individual class reading records and prescriptions. Other specific administration uses might be: payroll or fund-raising, inventory, and word processing. Many pre-packaged programs are available for these purposes. A computer really performs well in the above uses, but make sure the school's microcomputers are used primarily for instructional purposes if you have a limited amount of machines.

Besides its three main uses, a computer can be used as a laboratory for experimenting; a calculator; a typing tutor; a problem-solving tool; an aid to presenting information; an artistic medium, a musical instrument and let us not forget, a computer can be a stimulus for the mind.

SETTING UP
A COMPUTER CENTER IN SCHOOL

There are many ways to institute a computer program in a school and different approaches to physically setting up a computer center. The following model is to be used as a guide to making a computer center with a minimum of three microcomputers. If your school will have only the use of one or two computers, most of the ideas and suggestions would still be applicable.

ROOM ASSIGNMENT

Many factors must be taken into consideration when choosing the computer space within a school. The following suggestions will help you choose an appropriate location for the computers.

SECURITY

The room should:

- be above the first level of the building;
- have no easy access from above or below;
- be tied into the school's central alarm system and/or
- have its own local alarm system (smoke detectors are optional);
- have doors with special locks installed; and
- have no glass windows in doors

Other usual security measures should be followed such as labelling all equipment and not "advertising" the location of the center.

PHYSICAL LAYOUT

The lab should have sturdy large tables which should be positioned in a "U" pattern with the central station placed at or near the opening of the "U". All chairs should be made of wood, to avoid any static buildup. There should not be any carpets or like materials on the floor. The floor space should be as clutter free as possible. There should be other desks and chairs in the area for individual work away from the terminals. The room should be well lighted and the lighting should be as glare free as possible. Make sure there is no strong magnetic field near the room and especially near the terminals.

ELECTRICAL

There should be enough outlets in the room to handle the requirements of 3+ microcomputers and the video equipment. It should be noted that microcomputers have a very low current drain and therefore many micros and their associated equipment can be powered by using electrical "power strips" that have their own circuit breakers. All power cords and wires should be placed out of the way of any curious hands. All power hook-ups should be placed well behind the tables. All main electrical outlets should be checked for voltage spikes or line interference. Line filters are available to alleviate this problem.

SAFETY

The usual safety precautions should be followed when using any electrical equipment with these additions:

- at least one fire extinguisher;
- one first aid kit; and, if possible
- one master power cut-off switch.

CLASSROOM PROCEDURES

The following procedures are based on these assumption that: the class size will average thirty students; each class will be scheduled for the computer center two times per week; and the computer center will be set up as a "cluster" teaching position. If your set-up is different, modify the procedures below.

Please remember that the procedures outlined below are a guide. Some of the procedures would need certain modifications at individual schools or grade levels.

STEP 1

Before the class meets for the first time, there should be the following information on file for every student who will use the center:

- Student's name
- Student's homeroom class
- Student's I.D. number
- Student's age
- Student's average reading level
- Student's average math level
- Student's strong and weak academic areas

This information should be put on a form sheet so that it may be uniformly filled in by homeroom teachers.

NAME	CLASS	I.D.	AGE	Average Reading Level	Average Math Level	Strong Academic Areas	Weak Academic Areas

STEP 2
The student information would be used to "group" students for C.A.L. (Computer Assisted Learning). On certain courseware with record keeping capabilities, this information could be directly entered into the courseware database.

STEP 3
Each student would be coupled with another student for computer use and for seating purposes based on student information and peer relationships within the class.

STEP 4
All students would be required to bring a notebook and pencil or pen to each class. Each station would have a sign-in sheet for the student's name, date, and assignment to be worked on the computer.

STEP 5
This step deals with the step-by-step implementation of classroom procedures for a computer center.

First Day

- Students are met at the door to the room by the teacher
- Class attendance is taken
- A 10 minute general introduction to the computer stations and a "hands-on" introduction to the hardware to be used should be conducted
- The students will then sign in and begin their lessons
- Sign-in forms would be collected. At the end of the period a discussion and evaluation of the new program just used could be conducted. (Students can usually tell you if a program is worthwhile from a motivational standpoint, in a matter of minutes).
- Time to line up and prepare for next class
- Each student files in and goes to their assigned seats. (Maximum at a terminal should be no more than 4 students for group use of software.)

Second Day
When the class meets the second time during the week, the same procedures would exist as the first day except that computer literacy would be introduced. Computer Literacy (C.L.) should not be confused with computer programming. C.L. is the study of computers; how they work, how they affect our lives, what makes them run, etc., while computer programming is specifically concerned with learning a language to enable one to communicate with a computer.

Computer Literacy

The four main areas of computer literacy to be covered would be:

HISTORY
Some of the important turning points in the development of the computer and some of the individuals responsible for important advances in computing.

ANALYSIS and PROGRAMMING
Introduces some of the concepts of structured programming (structured programming is a technique which helps one compose a program starting with small building blocks and working upward to a complete program). It could be used as a direct jumping off point for Pilot, Pascal or introductions to other languages.

COMPUTER CONCEPTS
Introduces computer hardware and software systems.

IMPACTS and APPLICATIONS
Social and economic effects of the computer, both on the individual and on groups.

EVALUATING HARDWARE CHECKLIST

Before you evaluate, you must decide how the computer is going to be used in your school, for that will determine the features you require. If the microcomputers are going to be used only for Computer Literacy, then you could choose any microcomputer. If you are going to use the machine only for administrative purposes, then you should look for a computer with a large memory and good business applications. However, if you, like most schools, are going to choose a computer for use in two or more areas then you must look for a machine that is supported by excellent software. Software is the key. Look at the software first.

You should make up a check-list which will allow you to compare the different microcomputers on the market. The checklist should include these items:

	Excellent	Very Good	Good	Fair	Poor	
1. "USER FRIENDLINESS" - Is it easy to use and set up? _____						
2. Is the documentation that tells you how to operate the computer clear and easy to understand? _____						
3. AVAILABILITY OF SOFTWARE AND PROGRAMS - What subject areas? _____						
- What grade levels? _____						
- What accessories are available? _____						
4. EXPANDABILITY - Is it easy to add other devices? _____						
. printer _____						
. disk drive _____						

	Excellent	Very Good	Good	Fair	Poor	
5. ADDED ATTRACTIONS						
- Does it have color? _____						
- Does it have good graphics? _____						
- Is the sound built-in? _____						
6. DURABILITY						
- Is it put together well? _____						
- Is it sturdy? _____						
- Will it stand abuse? _____						
7. DEPENDABILITY						
- Good frequency of repair record? _____						
8. COST						
- Does it meet your budget requirements? _____ (Remember to compare similar computer set-ups when you compare prices. A computer that "starts" at $300.00 may cost five times that much to equip it the way you want and a computer that "lists" at $1,400.00 may have all the features already built-in.)						
9. SERVICE						
- Is it readily available? _____						
- Is it reliable and fast? _____						

EVALUATING SOFTWARE
Procedures and Criteria

Software evaluation is an integral part of using any microcomputer in the school. If you're using microcomputers for computer assisted instruction and/or administrative purposes, then selection of the right software and courseware is vital to the successful use of the computers. Relatively inexpensive computer hardware is capable of providing very powerful and flexible tools for teaching. By itself a computer, with no operating program, is just a collection of various electronic parts. It will just stare at you! No matter how potentially powerful and exciting, the overall usefulness of the computer will be ultimately determined by the quality (not quantity) of the software available.

If you've finally received some promising software to evaluate, how do you decide if it is worthwhile to purchase? How do you decide if it's educationally sound? There are some general procedures you should follow when you begin to view each piece of software on the computer:

PROCEDURES

1. Take the program and load it into the computer. Run the program to briefly see how it looks and how it "feels".
2. Imagine that you are a student interacting with the program. At this point note any weaknesses which you feel are apparent. Test all the special features of the program. Use the program as a successful student. Do not try to purposely make mistakes.
3. Make as many mistakes as possible. See what the program does in different student error situations. Make the same type of mistakes to see how the program handles it. Also, make typing errors. If a program does make errors and goes "bonkers", imagine if it happens with a room full of students.

4. Using some type of criteria that you have developed (see below), record your observations on a checklist.

5. Compare your checklist and observations to the software claims made by the manufacturer of the program.

6. If comparing similar programs, such as five addition programs, compare one against the other. Then make your decision whether to buy or not to buy. That is the question.

7. Another useful step is to let the students test the software. They can tell you very quickly if the program holds their interest and is exciting. With lengthy programs, try to review these in actual class situations with different students.

CRITERIA

You must have a set of criteria for judging the educational value of a program. Some criteria that can be used are listed below:

a. Does the software follow good educational practices?
b. Does the software take advantage of the capabilities of the computer?
c. Does the program fulfill its intended purpose?
d. Is the software suitable for the intended users?
e. Can you and your student use the program comfortably; is it easy to use?
f. Is the program adaptable to different children, different grade levels and different teaching methods?
g. Will the program hold the user's attention?
h. Does the software provide stimuli and feedback to the student??
i. Is the program topic clearly defined?
j. Is the documentation easy to use and understand?
k. Are the directions clear?
l. Does the user control the computer or does the computer control the user?
m. Are the use of special effects (color, graphics, sound, music) instructionally sound or distracting?
n. Is the material presented, educationally accurate?

Review Before Purchasing

A major problem confronting anyone who must review and evaluate software is acquiring the software to review before purchasing. The answer is simple. It's hard to get the manufacturers of software to send out preview copies of the programs, because of various copyright laws. Some manufacturers will set up software demonstrations at your school. There are some who will make a "preview" program and send that out so you can at least see a portion of the whole software package. You can contact other schools who might have a similar problem and have a "software party"! Or go to your local computer store to preview the educational software. There are many educational software catalogs from different manufacturers that you can look at to choose your software. Some offer a preview policy. When all else fails-persist!

The classification of a piece of software as excellent, good or poor, is a subjective judgment. Even if you use every criterion and checklist ever invented, the final decision will ultimately rest with your own personal perspective.

The guidelines stated should be helpful in your search for the better computer software for your school's needs.

EDUCATIONAL SOFTWARE DIRECTORY

(This Directory will need to be updated on a regular basis.)

Acorn Software Products, Inc.
634 N. Carolina Avenue., S.E.
Washington, DC 20003
/202 544-4259

Activity Resources, Inc.
P.O. Box 4875
Hayward, CA 94540
/ 415 782-1300

Addison Wesley Publishing Company
2725 Sand Hill Road
Menlo Park, CA 94025
/415 854-0300

Advanced Operating Systems
450 St. John Road
Michigan City, IN 46360
/219 879-4693

Adventure International
507 East St.
Box 3435
Longwood, FL 32750
/800 327-7172

Apple-Cations
21650 W. Eleven Mile Road
Suite 103
Southfield, MI 48076
/313 354-2559

Apple Computer Inc.
10260 Bandley Drive
Cupertino, CA 94017
/408 996-1010

Artworx Software Co.
150 N. Main Street
Fairport, New York 14450
/800 828-6573

Atari, Inc.
1272 Borregas Avenue
Sunnyvale, CA 94086
/408 745-5069

Atari Program Exchange
P.O. Box 427
155 Moffett Drive., B-1
Sunnyvale, CA 94086

Avant-Garde Creations
P.O. Box 30161
Eugene, OR 97403
/503 345-3043

Bargainbyte
P.O. Box 23195
Harahan, LA 70183

Basics and Beyond, Inc.
Box 10
Amawalk, NY 10501
#914 962-2355

Bell & Howell
7100 N. McCormick Road
Chicago, IL 60645
#312 262-1600

Bluebird's Computer Software
2267 23rd Street
Wyandotte, MI 48192
#313 285-4455

Borg-Warner Educational Systems
600 W. University Drive
Arlington Heights, IL 60004
#800 323-7577

Brain Box
601 West 26th Street
New York, NY 10003
#212 989-3573

California Software
P.O. Box 275
El Cerrito, CA 94530
#415 527-8717

Class 1 Systems
17909 Maple Street
Lansing, IL 60438
#312 474-4664

Commodore Computer
681 Moore Road
King of Prussia, PA 19406
#215 337-7100

Compress
P.O. Box 102
Wentworth, NH 03282
#603 764-5831

Compumax, Inc.
P.O. Box 1139
Palo Alto, CA 94301
#415 321-2881

Computer-Advanced Ideas, Inc.
1442A Walnut Street
Suite 341
Berkeley, CA 94709
#415 526-9100

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Computer Aided & Managed Instruction
P.O. Box 2030
Goleta, CA 93118

Computer Consulting
6723 E. 66th Place
Tulsa, OK 74133
#914 492-9036

Computer Curriculum Corp.
P.O. Box 10080
Palo Alto, CA 94303
#415 494-8450

Computer-Ed
1 Everett Road
Carmel, NY 10512
#914 225-1158

Computer Information Exchange
P.O. Box 159
San Luis Rey, CA 92068
#714 757-4849

Computer Learning Connection
One Boston Place
Boston, MA 02108
#617 723-4433

Computer's Voice
2370 Ella Drive Dept. 122
Flint, MI 28504
#313 238-5585

Computronics
50 N. Pascack Road
Spring Valley, NY 10977
#914 425-1535

Conduit
P.O. Box 388
Iowa City, IA 52240
#319 353-5789

Control Data Corporation
8100 34th Avenue South
P.O. Box 0
Minneapolis, MN 55440
#612 853-4541

Cook's Computer Company
1905 Baily Drive
Marshalltown, IA 50158

Creative Computing
39 E. Hanover Avenue
Morris Plains, NJ 07950
#800 631-8112

27-30 (enlarged)

Creative Software
201 San Antonio Circle #270
Mountain View, CA 94040
#415 948-9595

Creative Thamaturgy
P.O. Box 107 Forest Park Branch
Dayton, OH 45405

Curriculum Applications
P.O. Box 264
Arlington, MA 01174

Cybertronics International
999 Mt. Kemble Avenue
Morristown, NJ 07960
#201 766-7681

Dr. Daley's Software
Water Street
Darby, MT 59829
#406 821-3924

Developmental Learning Materials
One DLM Park
Allen, TX 75002
#214 248-6300

Digiac Corporation
175 Engineers Road
Smithtown, NY 11787
#516 273-8600

Dresen Associates
P.O. Box 246
Dresen, ME 04342
#207 737-4466

DYNACOMP
1427 Monroe Avenue
Rochester, NY 14618
#716 442-8960

Education Programs
Disney Electronics
6153 Fairmont Avenue
San Diego, CA 92120
#714 281-0285

Educational Activities
1937 Grand Avenue
P.O. Box 87
Baldwin, NY 11510
#516 223-4666

Educational Computing Systems
106 Fairbanks Road
Oak Ridge, TN 37830
#615 483-4915

Educational Courseware
3 Nappa Lane
Lees Port, CT 06880
#203 227-1438

Educational Micro Systems
P.O. Box 471
Chester, NJ 07930

Educational Services Management Corp.
P.O. Box 12599
Research Triangle Park, NC 27709
#919 781-1500

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Educational Software Midwest
414 Rosemere Lane
Maquoketa, IA 52060
#319 652-1334

Educational Software Professionals, Ltd.
38437 Grand River
Farmington Hills, MI 48018
#313 447-4470

Edu-Soft Educational Software
4639 Spruce Street
Philadelphia, PA 19139
#215 747-1284

Edutek Corporation
P.O. Box 11354
Palo Alto, CA 94036
#415 325-9965

Edu-Ware Services, Inc.
P.O. Box 22222
Agoura, CA 91301
#213 346-6783

Electronic Courseware Systems, Inc.
P.O. Box 2374, Station A
Champaign, IL 61820
#217 359-7099

Entelek
Ward-Whidden House
The Hill
P.O. Box 1303
Portsmouth, NH 03801
#603 436-0439

Etronix
14803 N.E. 40th Street
Redmond, WA 98052
#206 881-0857

J.L. Hammett Company, Inc.
Hammett Place
P.O. Box 545
Braintree, MA 02184
#617 848-1000

Hartley Software
P.O. Box 431
Dimondale, MI 48821
#616 942-8987

Hayden
50 Essex Street
Rochelle Park, NJ 07662
#201 843-0550

High Technology Software Products, Inc.
P.O. Box 14665
8001 N. Classen Blvd.
Oklahoma City, OK 73113
#405 840-9900

Holt-Rhinehart, Winston
383 Madison Avenue
New York, NY 10017
#212 872-2206

Houghton Mifflin Company
One Beacon Street
Boston, MA 02107
#617 725-5000

Information Unlimited Software
281 Arlington Avenue
Berkeley, CA 94707
#415 525-9452

Instant Software
Peterborough, NH 03458
#603 924-7296

Instructional Development Systems
29 Virginia Beach Blvd.
Virginia Beach, VA 23452
#804 340-1977

International Institute of Applied Technology, Inc.
20010 Century Blvd.
Germantown, MD 20767
#301 428-9010

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International Software Marketing, Ltd.
120 E. Washington Street
Syracuse, NY 13202
#315 474-3400

Interpretive Education
2306 Winters Drive
Kalamazoo, MI 49002
#616 345-8681

J & S Software
140 Reid Avenue
Port Washington, NY 11050
#516 944-9304

Krell Software
21 Millbrook Drive
Stonybrook, NY 11790
#516 751-5139

Learning Tools, Inc.
4 Washburn Place
Brookline, MA 02146
#617 566-7585

Level IV Products, Inc.
32461 School Craft
Livonia, MI 48150
#313 525-6200

Liberty Software Company
635 Independence Avenue S.E.
Washington, DC 20003
#202 544-6674

Lightning Software
P.O. Box 11725
Palo Alto, CA 94306
#415 856-1855

Little Genius
34-38 83rd Street
Jackson Heights, NY

Logo Computer Systems
989 Avenue of the Americas
New York, NY 10018
#212 564-2020

L & S Computerware
1589 Fraser Drive
Sunnyvale, CA 94087
#408 738-3416

McGraw-Hill
1221 Avenue of the Americas
New York, NY 10020
#212 997-6194

Charles Mann & Associates
55722 Santa Fe Trail
Yucca Valley, CA 92284
#714 365-9718

Math Software
1233 Blackthorn
Deerfield, IL 60015

Mathware/Math City
4040 Palos Verdes Drive N.
Rolling Hills Estates, CA 90274
#213 541-3377

MECC
2520 Broadway Drive
St. Paul, MN 55113
#612 376-1122

Mentor Software
Box 791
Anoka, MN 55303

Mercer Systems, Inc.
87 Scooter Lane
Hicksville, NY 11801

Merry Bee Communications
815 Crest Drive
Omaha, NE 68046
#402 592-3479

MicroGnome
5843 Montgomery Road
Elkridge, MD 21227
#301 796-2456

Microlab
2310 Skokie Valley Road
Highland Park, IL 60035
#312 433-7550

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Micro Learningware
P.O. Box 2134
N. Mankato, MN 56001
#507 625-2205

Microphys Programs
2048 Ford Street
Brooklyn, NY 11229
#212 646-0140

Micro Power & Light Company
12820 Hillcrest Road #224
Dallas, TX 75230
#214 239-6620

Microsoft Consumer Products
10700 Northup Way
Bellevue, WA 98004
#206 828-8080

Milliken Publishing Company
Computer Department
1100 Research Blvd.
St. Louis, MO 63132
#314 991-4220

Milton Bradley
443 Shaker Road
East Longmeadow, MA 01028
#413 525-6411

Monument Computer Service
Village Data Center
P.O. Box 603
Joshua Tree, CA 92252
#800 854-0561

Muse Software
347 N. Charles Street
Baltimore, MD 21201
#310 659-7212

National Software Marketing
4701 McKinley Street
Hollywood, FL 33021
#305 625-6062

Opportunities For Learning, Inc.
8950 Lurline Avenue
Chatsworth, CA 91311
#213 341-2535

Optimized Systems Software
10379 Lansdale Avenue
Cupertino, CA 95014
#408 446-3099

Prentice Hall
Sylvan Avenue
Englewood Cliffs, NJ 07632
#201 592-2649

Prescription Learning
1301 S. Wabash Avenue
Chicago, IL 60605
#312 922-0579

Program Design, Inc.
11 Idar Court
Greenwhich, CT 06830
#203 661-8799

Programs For Learning
P.O. Box 954
New Milford, CT 06776
#203 335-3452

Program Research and Software Corp.
257 Central Park West
New York, NY 10024
#212 787-1526

Quality Education Design
P.O. Box 12486
Portland, OR 97212
#503 287-8137

Radio Shack
1800 One Tandy Center
Fort Worth, TX 76102
#817 390-3832

Random House
2970 Brandywine Road
Suite 201
Atlanta, GA 30341

Rell
1125 Stanford Avenue
Redondo Beach, CA 90278

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27-30

Resource Software International
140 Sylvan Avenue
Englewood Cliffs, NJ 07632
#201 947-6104

Right On Programs
P.O. Box 977
Huntington, NY 11743

Science Research Associates (SRA)
155 North Wacker Drive
Chicago, IL 60606
#800 621-0665

Scott, Foresman & Company
1900 East Lake Avenue
Glenview, IL 60025
#312 729-3000

Serendipity Systems
225 Elmira Road
Ithaca, NY 14850
#607 277-4889

Simutek Computer Products, Inc.
4877 E. Speedway
Tucson, AZ 85712
#602 323-9391

Sliwa Enterprises, Inc.
P.O. Box 400
Big Flats, NY 14814
#607 562-3287

Software Exchange
6 South Street
Milford, NH 03055

Software House, Inc.
695 East 10th North
Logan, UT 84321
#800 453-2708

Solartek
P.O. Box 298
Guilderland, NY 12084

Southwest Edpsyche ServicesEducators
P.O. Box 1981
Burlington, NC 27215
#919 226-7610

South West Ed Psyche Services
P.O. Box 1870
Phoenix, AZ 85001

Sterling Swift Publishing Company
1600 Fortview Road
Austin, TX 78704

Storybooks of the Future
527 41st Avenue
San Francisco, CA 94121
#415 386-5184

TARA
P.O. Box 118
Selden, NY 11784
#516 331-2537

Teacher's PET Software
1517 Holly Street
Berkeley, CA 94703

Terrapin, Inc.
678 Massachusetts Avenue
Cambridge, MA 02139
#617 494-8816

Texas Instruments, Inc.
Personal Computer Division
P.O. Box 53
Lubbock, TX 79408
#800 858-4565

T.H.E.S.I.S.
P.O. Box 147
Garden City, MI 48135
#313 585-4722

3 R Software
P.O. Box 3115
Jamaica, NY 11431

Time Share Corporation
Hanover, NH 03755
#603 448-3838

TYC Software
40 Stuyvesant Manor
Geneseo, NY 14454
#716 243-3005

Tycom Associates
63 Velma Avenue
Pittsfield, MA 01201

27-30 (enlarged)

Unicom
297 Elmwood Avenue
Providence, RI 02907
#401 467-5600

Universal Systems for Education
2120 Academy Circle, Suite E
Colorado Springs, CO 80909
#303 574-4575

Versa Computing, Inc.
3541 Old Conejo Road., Suite 104
Newbury Park, CA 91320
#805 498-1956

Window, Inc.
469 Pleasant Street
Watertown, MA 02172
#617 923-9147

XPS, Inc.
323 York Road
Carlisle, Pa 17013
#717 243-5373

27-30
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BYTE P.O. Box 590, Martinsville, NJ 08836

CLASSROOM COMPUTER NEWS P.O. Box 266, Cambridge, MA 02138

COMPUTING TEACHER Department of Computer and Information Science, Unviersity of Oregon, Eugene, OR 97403

COMPUTE P.O. Box 789-M, Morristown, NJ 07960

CREATIVE COMPUTING 39 East Hanover Avenue., Morris Plains, NJ 07950

ELECTRONIC LEARNING 902 Sylvan Avenue, Englewood Cliffs, NJ 07632

INFORWORLD 375 Cochituate Road, Framingham, MA 01701

PERSONAL COMPUTING 4 Disk Drive, Box 13916, Philadelphia, PA 19101

POPULAR COMPUTING P.O. Box 307, Martinsville, NJ 08836

The following magazines are machine specific. They are written for a particular microcomputer.

APPLE

APPLE ORCHARD International Apple Corps, P.O. Box 976, Daly City, CA 95017

CALL-APPLE 304 Main Avenue., S., Suite 300, Renton, WA 98055

NIBBLE Box 325, Lincoln, MA 01773

PEELINGS II 945 Brook Circle, Las Cruces, NM 88001

SOFTALK 11021 Magnolia Blvd., North Hollywood, CA 91601

ATARI

A.N.A.L.O.G. P.O. Box 23, Worcester, MA 01603

ANTIC 297 Missouri Street, San Francisco, CA 94107

PURSER'S MAGAZINE P.O. Box 466, El Dorado, CA 95623

COMMODORE PET

CURSOR Box 550, Coleta, CA 93017

COMPUTE (specific for Apple, Atari, & PET) P.O. Box 5406, Greensboro, NC 27403

TRS-80 (RADIO SHACK)

TRS-80 MICROCOMPUTER NEWS 700 One Tandy Center, Fort Worth, TX 76102

80-MICRO, 80 Pine Street, Peterborough, NH 03458

80-US 3838 S. Warner Street., Tacoma, WA 98409

SOFTSIDE (specific for Apple, Atari, TRS-80) P.O. Box 68, Milford, NH 03055

TEXAS INSTRUMENTS

99'er Magazine, 1500 Valley River Drive, Suite 250, Eugene, OR 97401

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GLOSSARY OF COMPUTER TERMS

ADDRESS: Is a number or a name that tells where to find a place in a computer's memory

ARITHMETIC OPERATOR: A symbol that tells the computer to perform an arithmetic operation. On a computer the symbols are: "+" addition; "-" subtraction; "*" multiplication; "/" division

ASCII CODE: Stands for **A**merican **S**tandard **C**ode for **I**nformation **I**nterchange ("ask-ee"). Computers store letters and numbers using this code.

ASSEMBLY LANGUAGE: A programming language that uses memonic symbols.

AUTHORING LANGUAGE: Is a computer program which helps a person write lessons or other programs for a computer.

BASIC: Stands for **B**eginners **A**ll-Purpose **S**ymbolic **I**nstruction **C**ode. It is a language all microcomputers use and is an easy language to learn.

BINARY CODE: Is a way of writing information for a computer. This code only uses 1's and 0's to stand for numbers and letters.

BIT: The basic unit for computer memory. Stands for **BI**nary digi**T**.

BOOT: This does not mean to kick the computer! This is the start up program used when the computer is turned on. Used as in "boot the disk".

BUG: A bug is a mistake in a computer program or a problem with the hardware. To get rid of the "bug" (no, you don't stomp on it), you "de-bug" the program.

BYTE; A byte is a group of bits. One byte is 8 bits. It takes one byte to store each unit of information. The word "help" requires 4 bytes.

CASSETTE RECORDER: Is the same as a tape recorder, but uses smaller tapes. Cassette tapes are inserted into it to save and load programs.

CAI: Computer **A**ssisted (**A**ided) **I**nstruction-teaching by computer.

CATHODE RAY TUBE (CRT): A fancy name for a T.V. screen. Be a name dropper. Ask someone what they watched on their CRT last night.

CENTRAL PROCESSING UNIT (CPU): This is the part of the computer dealing with information. It is the heart of the computer.

CHIP: A chip is a very tiny piece of material (silicon) that carries many electrical signals.

COBOL: Another computer language, mainly used for business applications. It stands for **CO**mmon **B**usiness **O**riented **L**anguage.

CODE: Is a set of instructions or orders for the computer.

COMMAND: An instruction that tells the computer to carry out an instruction immediately.

COMPUTER: A computer is a machine that can receive and follow instructions, solve a problem or output, and answer. It can compile, correlate, and select data and information.

COMPUTER OPERATOR: That's YOU!

CURSOR: Is the little flashing square on the screen that indicates where the next letter, number or other character will be displayed. If you use computers for any length of time, you will soon realize that this little square is appropriately named.

DATA: Is information that the computer needs to solve a problem. It can be any item of information.

DISK (DISKETTE, FLOPPY DISK, MINI-DISK): A disk looks like a 45RPM record. It is made of magnetic material stored inside a plastic jacket. Very fashionable!

DISK DRIVE: Guess what goes into a disk drive? It is a machine which reads or writes information onto a disk at very high speed.

DISK OPERATING SYSTEM (DOS): This is a program that tells the computer how to use the disk drive. This program is needed to operate the disk drive.

EDIT: To make changes in data or a program.

FIRMWARE: Software stored in hardware form. All those video-game cartridges are firmware.

FLOWCHART: Is a drawing, chart or set of steps needed to solve a problem. Flowcharts are used to plan computer programs.

FORTRAN: This is a computer language used mainly by scientists. It stands for **FOR**mula **TRAN**slator.

GRAPHICS: The ability of the computer to show pictures, charts, special characters on the screen or printer.

HARDWARE: All the various physical components of a computer; the computer machinery. Hardware stores do not sell computers....not yet.

HOME COMPUTER (PERSONAL COMPUTER): The same computer you use in school, but now you have it home.

INPUT: Information that goes into a computer. You use an input device (a keyboard).

INTERFACE: Connecting a computer to another machine or to a different computer. You might interface a printer to a computer.

KEYBOARD: Is used to type information into a computer.

K: An abbreviation for Kilo=1,000. 16k of memory is equal to about 16,000 bytes. The more "K" your computer has, the more memory.

LOGO: A computer language used in education. It includes a graphics system called "turtle graphics". A very interactive language.

LOG-IN: Sign in....on a computer.

MENU: A display shown on the screen that gives you a list of options-like a table of contents in a book. You can not order food from a menu, although many restaurants use computers.

MICROCOMPUTER (computer): A small computer. A minicomputer is larger than a microcomputer. A main-frame computer is very large.

MODEM: Stands for **MO**dulating and **DEM**odulating device. It allows you to use a telephone to communicate with another computer via the telephone lines.

OUTPUT: The information the computer sends out. An output device is needed to see this information. A T.V. or printer can be used.

PASCAL: A high level computer language named for French mathematician Blaise Pascal.

PERIPHERAL: Any piece of equipment connected to a computer. A modem is a peripheral.

PILOT: Stands for Programed Inquiry learning On Teaching. An easy to learn language primarily used by educators to create CAI programs.

PRINT OUT: Is a paper copy (hard copy) of information from a computer.

PROGRAM: Is a set of instructions which tells the computer what to do and how to do it. There are many programming languages (see above).

RAM: Stands for **R**andom **A**ccess **M**emory. While the computer is on, it stores information for a short period of time.

ROM: Stands for **R**ead **O**nly **M**emory. This information can only be "read" by the computer. The information in this type of memory can not be changed and is not erased when the machine is shut off.

SOFTWARE: The programs and data used to control the computer. Programmers write software (courseware) for microcomputers.

STATEMENT: Is a line in a computer program. 20 print "Hello" is a statement.

WORD PROCESSING: A very exciting way of helping you create written communications, such as letters. It makes it easy to change words, paragraphs, or to correct spelling. To receive hard copies you would use a printer.

ZATS: As in, "Zats all folks!"